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EXAMINER

DANIELS, MATTHEW J

ART UNIT PAPER NUMBER

1732

DATE MAILED: 01/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/763,260

Applicant(s)

BRANDT, GUNNAR

Examiner

Matthew J. Daniels

Art Unit

1732

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 September 2005 and 13 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) 33-41 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>9/14/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. In the response received 14 September 2005, Claims 10 and 11 were amended. No claims were cancelled and no new claims are present.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. **Claim 2** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In this case, it is not clear whether the Applicant intends to claim that the current: a) travels directly through the workpiece (current transmitted by the workpiece); b) travels through impurities in the workpiece; or c) travels through physical conduction paths of the pressure transmitting medium through holes or gaps in the workpiece. It is noted that the Applicant has not responded to this rejection.

3. The rejection of Claim 11 set forth previously under this section is withdrawn in view of the amended claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1732

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1-19, 22-32** are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldberger (USPN 5348694) in view of Yang (USPN 6417126) and Shen (J. Am. Ceram. Soc., Vol. 85, Num. 8, pg. 1921-1927). **As to Claim 1**, Goldberger teaches a method comprising the steps of forming a mixture (1:15-16) into a preformed workpiece (2:8-18); heating the workpiece at a heating rate of 50 degrees C/min (4:26) to a sintering temperature above 2000 degrees C (3:34-37). Goldberger appears to be silent to the other claimed limitations, namely the following:

- a) milling and mixing powders of alumina and silicon carbide whiskers
- b) holding the workpiece at the sintering temperature for a holding time of from about 5 to about 60 minutes at a pressure between 20 to 100 MPa.

However, these limitations are prima facie obvious for the following reasons:

- a) Yang teaches milling and mixing powders of alumina and silicon carbide whiskers (2:61-64) and sintering at 1900 C (10:61-62). Yang additionally teaches that every 1% increment of density above a density of 97% can dramatically increase the structural properties of the fired composite (7:18-23).
- b) Shen teaches holding the workpiece at the sintering temperature for a holding time of from about 5 to about 60 minutes at a pressure between 20 to 100 MPa (See Pg. 1923, Fig. 4 for the

Art Unit: 1732

time and *Pressure Effect* paragraph, right column). Shen additionally teaches an apparatus (Page 1921, Fig. 1) that appears to be highly similar to that of Goldberg (Fig. 1).

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the methods of Yang and Shen into that of Goldberger in order to produce a cutting tool (Yang, 1:48-53) having a density of 99-100% (See Shen, Page 1924, Fig. 5), which Yang clearly suggests to be desirable because of the improvement in structural properties that would result (Yang, 7:18-23). **As to Claim 2**, Shen teaches spark plasma sintering (Title). In order for there to be a plasma generated within the workpiece and between the ceramic particles, there would have inherently been some current that passed through the workpiece in order to generate the plasma. In an alternative interpretation, Goldberger teaches turbine rotors (2:5) which would inherently have gaps between the blades in the rotors and a hole in the center for a shaft. As such, these gaps would provide a conduction path “through said workpiece.” In a third interpretation, Goldberger teaches a binder which pyrolyzes to about 2% free carbon (7:26-32). It would have been prima facie obvious that this binder would pyrolyze to graphite, which is a known conductor and would provide conduction paths within the article. In a fourth interpretation, Applicant admits on Pages 4-5 (paragraph [0029]) that Goldberger’s method and apparatus produce the same effect as that of the instant application. In any of these interpretations, the Applicant’s claim is prima facie obvious over the prior art. **As to Claim 3**, Goldberger teaches an unpulsed current (8:17-20). **As to Claim 4**, Shen teaches pulsed current (See Page 1924, *Pulse-Sequence Effect*), which would have been obvious in order to increase the rate of densification. **As to Claim 5**, Goldberger teaches providing a bed comprising a bed

Art Unit: 1732

material of electrically conductive flowable particles with a contained zone (Fig. 1, Items 54, 52, 16, and 22 and 6:59-62), placing the workpiece in the bed (Fig. 1, Item 56), applying a pressure to the bed (7:29-32), and heating up the workpiece by applying electrical energy to the electrically conductive, flowable particles within the heating rate (7:35-41 and 4:26). **As to Claim 6**, Goldberger teaches a bed of particles comprising graphite (4:50-55). **As to Claim 7**, Goldberger teaches spherical graphite (4:50-55). **As to Claim 8**, Yang teaches 1900 degrees C (3:45-60). **As to Claim 9**, Yang teaches 1900 degrees C (3:45-60). Shen additionally teaches that any temperature over 1300 degrees C leads to full densification (Pg. 1924, Fig. 5). **As to Claim 10**, Yang teaches a heating rate of 20 degrees C/min (3:52). Shen provides additional teaching of the heating rate as it affects density and grain size (Pg. 1924, Fig. 7). **As to Claim 11**, Shen teaches a heating rate from about 25 degrees C/min (Pg. 1924, Fig. 7). **As to Claim 12**, Yang teaches 10 to 30 minutes (3:55). **As to Claim 13**, Yang teaches 10 to 20 minutes (3:55). **As to Claim 14**, Yang teaches from about 15 minutes (3:55). **As to Claim 15**, Shen teaches 50 to 100 MPa (See *Pressure Effect*, Page 1923). **As to Claim 16**, Shen teaches 50 to 100 MPa (See *Pressure Effect*, Page 1923). **As to Claim 17**, Yang teaches a method wherein the composite material comprises alumina plus silicon carbide whiskers in a total proportion of at least 90 % by weight (4:38-50). Because all of the components (alumina, silicon carbide, and boron carbide) have densities between 2.4 and 4 grams/cubic centimeter, the weight fraction is approximately the same as the volume fraction, and therefore the applicant's claim would have been prima facie obvious. **As to Claim 18**, Yang teaches as much as 99% comprising alumina and silicon carbide whiskers (4:37-50). Because all of the components (alumina, silicon carbide, and boron carbide) have densities between 2.4 and 4 grams/cubic centimeter, the weight fraction

Art Unit: 1732

is approximately the same as the volume fraction, and therefore the applicant's claim would have been prima facie obvious. **As to Claim 19**, in the method of Yang, silicon carbide whiskers (4:50) comprise about 5 to 15% by weight (4:42). Because all of the components (alumina, silicon carbide, and boron carbide) have densities between 2.4 and 4 grams/cubic centimeter, the weight fraction is approximately the same as the volume fraction, and therefore the applicant's claim would have been prima facie obvious. **As to Claims 22-29**, the Examiner takes the position that these limitations are article limitations. There is no method step claimed, and these limitations are therefore not given patentable consideration in examination of the method. However, by disclosing that the temperature ramp rate (See Pg. 1923, *Heating-Rate Effect*, and Fig. 7), sintering time (Fig. 4), pressure (See Pg. 1923, *Pressure Effect*), and sintering temperature (Fig. 5) can each be modified, Shen teaches that all of these parameters appear to reflect result-effective variables, which can be optimized to minimize the grain size (See entire document). Therefore, it would have been prima facie obvious to one of ordinary skill in the art to optimize and select conditions which produced alumina grain sizes having a mean diameter or 80th percentile of less than 0.9 microns, as claimed in Claims 22-29, through routine experimentation of the temperature ramp rate, sintering time, pressure, and sintering temperature. See MPEP 2144.05 II and *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). **As to Claims 30-32**, Yang teaches magnesia or yttria (7:63) as a sintering aid in a proportion of from about 0.01 to about 5%, 0.02 to about 1%, and 0.03 to about 0.5% (each is encompassed by "an amount up to and including 5 wt % of the composition," Yang 7:65-66).

Art Unit: 1732

5. **Claims 20-21**, are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldberger (USPN 5348694) in view of Yang (USPN 6417126) and Shen (J. Am. Ceram. Soc., Vol. 85, Num. 8, pg. 1921-1927), and further in view of Brandt (USPN 5418197). Goldberger, Yang, and Shen teach the subject matter of Claims 1 and 19. See the rejection of Claims 1 and 19 under 35 USC 103(a). **As to Claim 20**, Goldberger, Yang, and Shen are silent to the claimed limitation. However, Brandt teaches 10% to 50% by volume of homogeneously dispersed whiskers of silicon carbide (3:3-7). It would have been prima facie obvious to incorporate the method of Brandt into that of Goldberger, Yang, and Shen because doing so would lead to a greatly improved fracture toughness and strength (1:59). Brandt also appears to suggest the combination because the method of Goldberger is pseudo-isostatic because of the bed of particles acts in an isostatic manner and uses a graphite tool, and Brandt suggests both an isostatic sintering method or pressure sintering in a graphite tool (3:39-42). **As to Claim 21**, Goldberger, Yang and Shen are silent to the claimed limitation. However, Brandt teaches 10% to 50% by volume of homogeneously dispersed whiskers of silicon carbide (3:3-7).

Response to Arguments

6. Applicant's arguments filed 14 September 2005 have been fully considered but they are not persuasive. The arguments appear to be on the following grounds:

- a) Goldberger only teaches steps c and d of Claim 1.
- b) Goldberger teaches the consolidation of any kind of workpiece, and does not teach a cutting tool insert

Art Unit: 1732

- c) Goldberger does not disclose any of the components used for the workpiece of the present invention.
- d) Goldberger teaches away from the claimed parameters in Examples II and III, and in 3:38-44
- e) The preferred compaction pressures are far below the claimed range
- f) Yang does not disclose whiskers of silicon carbide
- g) Yang teaches away from the combination with Goldberger. Goldberger teaches applying a high heating rate, short holding times and high sintering pressure, whereas Yang discloses the opposite, namely low heating rates, longer hold times, and ambient pressure.
- h) Shen's method is completely different than Goldberger and Yang. Shen teaches completely different parameters, a lower temperature, and pressures over 100 MPa. Shen teaches away from the present invention.
- i) The rejections are based on hindsight.
- j) Brandt does not cure the deficiencies

7. These arguments are not persuasive for the following reasons:

a, b, c) While the Applicant's remarks indicate that Goldberger doesn't teach a cutting tool insert, the Examiner submits that this is an intended use limitation. The Examiner further submits that Goldberger's article could be used as a cutting tool insert, regardless of its shape or size, and thus meets the limitation to the intended use. The arguments do not appear to indicate that a cutting tool insert has any particular shape that could not be made by Goldberger's method, but only that Goldberger has not made the claimed object. Additionally, Yang teaches that the mixture can be used as cutting tools (1:38-2:20). While the Applicant's remarks indicate

Art Unit: 1732

that Goldberger is silent to any of the components of the workpiece of the invention, the Examiner submits that Goldberger is generic and non-limiting, disclosing particulate metals, ceramic materials, or combinations of such materials (1:13-18).

d) The Applicant's arguments appear to assert that Goldberger teaches away from the claimed parameters, and from combinations with the other cited references. The Examiner respectfully disagrees. In particular, Goldberger's teaching of Examples II and III teaches only a value, and does not teach away. The portion at 3:38-44 is directed at pressureless sintering, and not at the method disclosed in that Patent. Additionally, Goldberger's method, taken alone or in combination with Yang and Shen, contains more broad teachings that the pressure, temperature, ramp rate, and time, all appear to represent result-effective variables which can be optimized. See MPEP 2144.05 II and *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The Examiner submits that particular process variables, such as the sintering temperature, sintering pressure, ramp rate, and hold time, are well known by the ordinary artisan to be optimizable quantities. The references used in the rejections provide evidence of this position.

e, g, h) In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The Examiner submits that Yang's teaching of the composition, used in Goldberger's method, combined with Shen's teaching about the sintering conditions, would have rendered obvious the claimed conditions. Additionally, it should be noted that these references teach the *specific* conditions claimed. The references additionally teach more broadly the result-effective nature of all of the variables

claimed. Thus, it would have been prima facie obvious that the skilled artisan would have arrived at the claimed values by optimization of these variables.

f) Yang specifically discloses whiskers (4:49-50).

i) In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In this case, Goldberger's method and Yang's composition are both known. Shen teaches that the sintering pressure is a result effective variable which is optimizable to increase the density and reduce the porosity of the formed article.

j) The rejection in view of Brandt is not specifically argued.

8. The rejection of Claim 2 under 35 USC 112, second paragraph should also be noted, as it has not been addressed by the Applicant's remarks.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

Art Unit: 1732

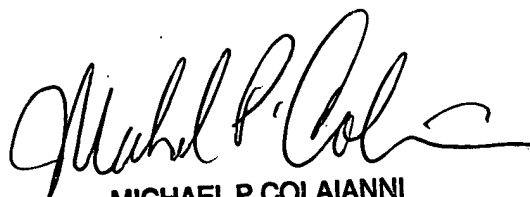
MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Daniels whose telephone number is (571) 272-2450. The examiner can normally be reached on Monday - Friday, 7:30 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Colaianni can be reached on (571) 272-1196. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJD 12/26/05



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